

THAT WHICH IS CLAIMED:

1. A wafer comprising:  
a substrate having opposed first and second major surfaces and a peripheral edge  
extending therebetween, wherein a cross-sectional profile of the edge comprises:  
5 an angled edge segment adjacent the first major surface that extends  
linearly at a predefined angle relative to a reference plane defined by the first  
major surface; and  
a curved edge segment that defines a continuous curve extending from the  
angled edge segment to the second major surface.
- 10 2. A wafer according to Claim 1 wherein the curved edge segment comprises  
a radiused surface extending from the angled edge segment to the second major surface.
3. A wafer according to Claim 1 wherein the second major surface has a  
smaller diameter than a medial portion of said substrate between said first and second  
major surfaces.
- 15 4. A wafer according to Claim 3 wherein the diameter of the second major  
surface is between 100 microns and 300 microns smaller than a diameter of that portion  
of said substrate having the largest diameter.
5. A wafer according to Claim 1 wherein the first major surface has a smaller  
diameter than a diameter of the second major surface.
- 20 6. An intermediate wafer assembly comprising:  
a handle wafer; and  
a bonded wafer attached to said handle wafer,  
wherein said handle wafer and said bonded wafer each include a respective edge  
extending peripherally thereabout, and wherein the edge of each respective wafer defines  
25 a radiused surface that extends continuously to an interface between said handle and  
bonded wafers.

7. An intermediate wafer assembly according to Claim 6 wherein each wafer comprises opposed major surfaces, and wherein the major surface of each wafer that is proximate the interface has a smaller diameter than a medial portion of the respective wafer between the opposed major surfaces.

5 8. An intermediate wafer assembly according to Claim 7 wherein the diameter of the major surface of each wafer that is proximate the interface is between 100 microns and 300 microns smaller than a diameter of that portion of the respective wafer having the largest diameter.

10 9. An intermediate wafer assembly according to Claim 6 wherein each wafer comprises opposed major surfaces, and wherein a cross-sectional profile of the edge of each respective wafer also includes an angled edge segment, adjacent the major surface opposite the interface, that extends linearly at a predefined angle relative to a reference plane defined by the respective major surface.

15 10. An intermediate wafer assembly according to Claim 9 wherein the major surface opposite the interface has a smaller diameter than a diameter of the major surface proximate the interface.

11. An intermediate wafer assembly comprising:

a handle wafer; and

20 a bonded wafer attached to said handle wafer, said bonded wafer having a first major surface facing away from said handle wafer, a second major surface proximate said handle wafer, and a peripheral edge extending between the first and second major surfaces, wherein a cross-sectional profile of the edge comprises:

25 a first angled edge segment adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

a second angled edge segment adjacent the second major surface that extends linearly at a predefined angle relative to a reference plane defined by the second major surface, wherein the second angled edge segment is at least 50% smaller in a radial

direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface; and  
a curved edge segment that defines a continuous curve extending between the first and second angled edge segments.

5           12.     An intermediate wafer assembly according to Claim 11 wherein the curved edge segment of said bonded wafer comprises a radiused surface extending between the first and second angled edge segments.

10           13.     An intermediate wafer assembly according to Claim 11 wherein said handle wafer also has a first major surface facing away from said bonded wafer, a second major surface proximate said bonded wafer, and a peripheral edge extending between the first and second major surfaces, wherein a cross-sectional profile of the edge comprises:  
a first angled edge segment adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;  
a second angled edge segment adjacent the second major surface that extends  
15 linearly at a predefined angle relative to a reference plane defined by the second major surface, wherein the second angled edge segment is at least 50% smaller in a radial direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface; and  
a curved edge segment that defines a continuous curve extending between the first  
20 and second angled edge segments.

          14.     A method fabricating a wafer having opposed first and second major surfaces and a peripheral edge extending therebetween, the method comprising:  
grinding a portion of the edge adjacent to the first major surface to form an angled edge segment that extends linearly at a predefined angle relative to a reference plane  
25 defined by the first major surface; and  
grinding another portion of the edge to form a curved edge segment that defines a continuous curve extending from the angled edge segment to the second major surface.

          15.     A method according to Claim 14 wherein grinding another portion of the edge comprises grinding another portion of the edge to form the curved edge segment

that comprises a radiused surface extending from the angled edge segment to the second major surface.

16. A method according to Claim 14 wherein grinding another portion of the edge comprises grinding another portion of the edge to form the curved edge segment  
5 such that the second major surface has a smaller diameter than a medial portion of the wafer between the first and second major surfaces.

17. A method according to Claim 16 wherein grinding another portion of the edge comprises grinding the edge such that the diameter of the second major surface is between 100 microns and 300 microns smaller than a diameter of that portion of said  
10 substrate having the largest diameter.

18. A method according to Claim 14 wherein the grinding steps comprise grinding the edge such that the first major surface has a smaller diameter than a diameter of the second major surface.

19. A method of fabricating a silicon on insulator (SOI) wafer comprising:  
15 grinding an edge of a handle wafer to form a radiused surface that extends continuously to one major surface of the handle wafer;  
grinding an edge of a bonded wafer to form a radiused surface that extends continuously to one major surface of the bonded wafer; and  
bonding the handle wafer and the bonded wafer such that the respective radiused  
20 surfaces extend continuously to an interface between the handle and bonded wafers.

20. A method according to Claim 19 wherein each wafer comprises opposed major surfaces, wherein the major surface of each wafer that is proximate the interface has a smaller diameter than a medial portion of the respective wafer between the opposed major surfaces, and wherein the method further comprises additionally grinding the edges  
25 of the handle and bonded wafers following the bonding of the handle and bonded wafers such that the resulting SOI wafer has a diameter that is no larger the diameter of the major surface of each wafer that is proximate the interface prior to the additional grinding.

21. A method according to Claim 20 wherein the grinding steps comprise grinding the edge of the respective wafer such that the diameter of the major surface proximate the interface is between 100 microns and 300 microns smaller than a diameter of that portion of the respective wafer having the largest diameter.

5 22. A method according to Claim 19 wherein each wafer comprises opposed major surfaces, and wherein the method further comprises:

grinding a portion of the edge of the handle wafer adjacent the major surface that is opposite the interface to form an angled edge segment that extends linearly at a predefined angle relative to a reference plane defined by the respective major surface;

10 and

grinding a portion of the edge of the bonded wafer adjacent the major surface that is opposite the interface to form an angled edge segment that extends linearly at a predefined angle relative to a reference plane defined by the respective major surface.

15 23. A method of Claim 22 wherein the grinding steps comprise grinding the edge of each wafer such that the major surface opposite the interface has a smaller diameter than a diameter of the major surface proximate the interface.

24. A method of fabricating a silicon on insulator (SOI) wafer comprising:  
grinding an edge of a bonded wafer that extends between opposed first and second major surfaces and peripherally thereabout, wherein grinding the edge of the  
20 bonded wafer comprises:

grinding a first angled edge segment adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

25 grinding a second angled edge segment adjacent the second major surface that extends linearly at a predefined angle relative to a reference plane defined by the second major surface, wherein the second angled edge segment is at least 50% smaller in a radial direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface; and

grinding a curved edge segment that defines a continuous curve extending between the first and second angled edge segments; and

bonding the bonded wafer to a handle wafer such that the second angled edge segment is proximate the handle wafer.

5           25.     A method according to Claim 24 wherein grinding the curved edge segment comprises grinding a radiused surface extending between the first and second angled edge segments.

10           26.     A method according to Claim 24 wherein said handle wafer also has a first major surface facing away from the bonded wafer, a second major surface proximate the bonded wafer, and a peripheral edge extending between the first and second major surfaces, wherein the method further comprises grinding the edge of the handle wafer, and wherein grinding the edge of the handle wafer comprises:

15                 grinding a first angled edge segment adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

                  grinding a second angled edge segment adjacent the second major surface that extends linearly at a predefined angle relative to a reference plane defined by the second major surface, wherein the second angled edge segment is at least 50% smaller in a radial direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface; and

20                 grinding a curved edge segment that defines a continuous curve extending between the first and second angled edge segments.